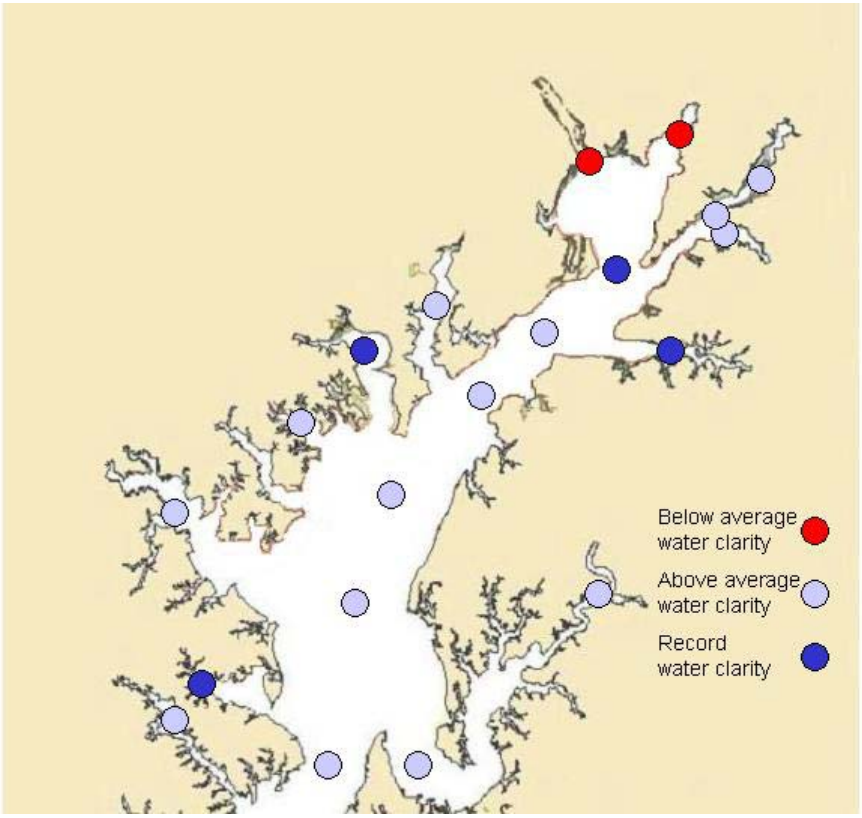
Unusual water clarity, bay grasses, macroalgae, and mussels in the Upper Chesapeake Bay; Summer 2004.

(8/27/04)

Maryland Department of Natural Resources has observed unusually clear water, growth of bay grasses (also known as “Submerged Aquatic Vegetation” or “SAV”), macroalgae, and mussels throughout a large area of the Chesapeake Bay mainstem and tributaries north of the bay bridge during June, July, and August 2004. Below is a summary of observations and a possible explanation.

Water Clarity – Sunlight is critical to plant growth and survival and, as such, is important to the health of Chesapeake Bay. The clarity of the water is determined by a variety of factors including the amount of algae in the water, suspended sediments, and natural coloration. Water clarity is strongly influenced by the amount of rainfall. Typically the greater the amount of rain, the poorer the water clarity due to the sediment and nutrients carried by runoff into the Bay.

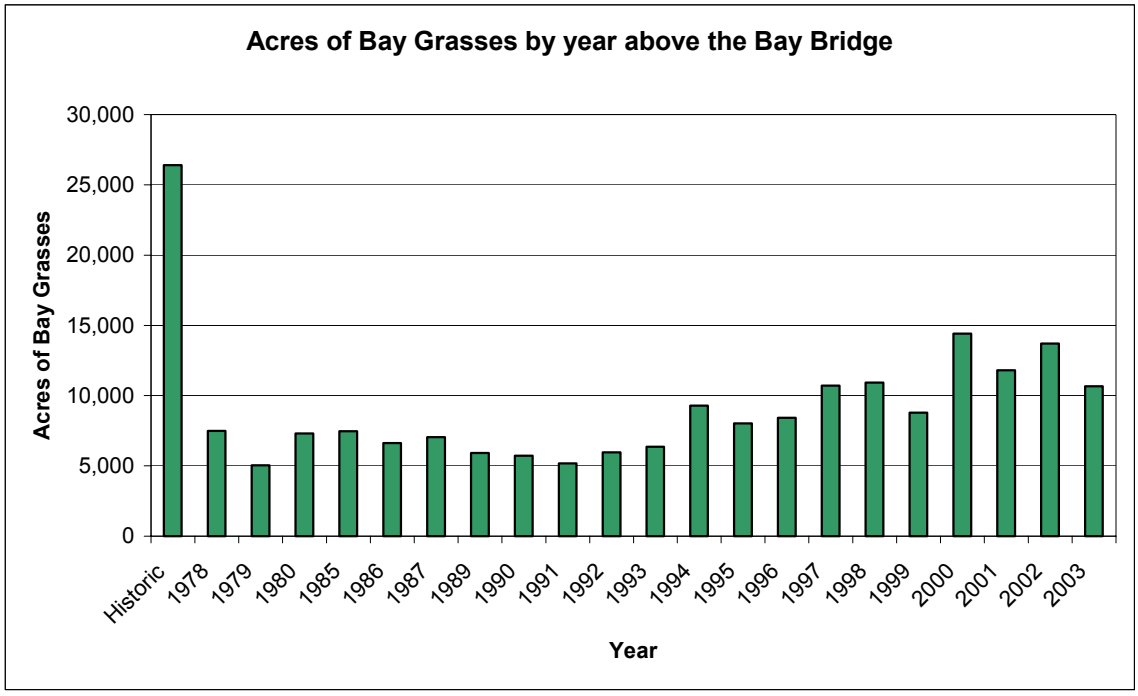
Since May 2004, many Maryland DNR monitoring stations in the Upper Chesapeake Bay have shown improved water clarity at or above 20 year averages for this time of year. This is particularly unusual given the relatively wet summer we have experienced in this area.



Upper Chesapeake Bay water clarity at long-term monitoring stations, July – August 2004

Bay Grasses – A cornerstone of Bay recovery with a restoration goal of 185,000 acres by 2010, bay grasses provide critical spawning, breeding, and feeding habitat for a wide variety of Bay life. Grass beds also serve as a filter to trap sediment in the water column and improve water clarity. Bay grass acreage throughout the Bay remains at a fraction of its historic abundance due to increased sediment and nutrient loading and the subsequent decreases in light availability.

Bay grass acreage above the Bay Bridge, has doubled since routine monitoring began in 1985. The resource has been steadily improving in terms of species diversity and density in addition to increasing in geographical coverage. In the peak year of 2000, bay grasses occupied 55% of their historic range, and 16 species are commonly found in this area. Year to year fluctuations are still substantial, and in 2003 this area of the Bay experienced a 22% decline in bay grass coverage associated with one of the highest rainfall years on record.

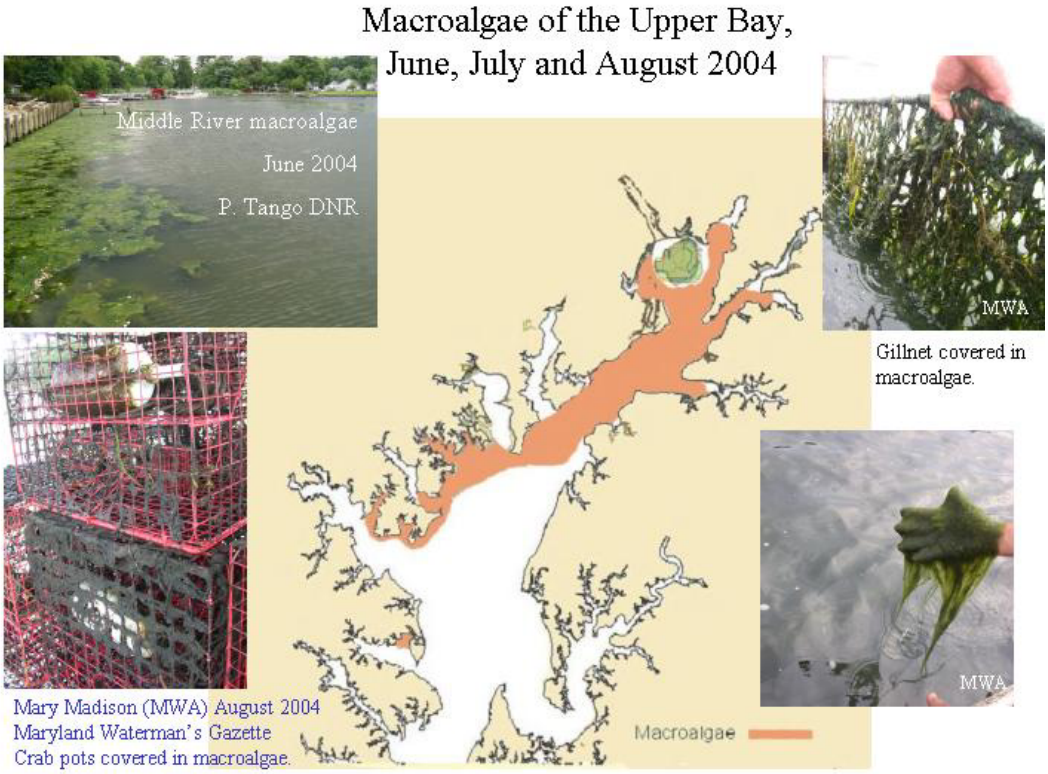


During the summer of 2004, DNR has received many calls regarding abundant bay grasses in the upper Bay, sometimes in areas where little or none has been observed in the recent past (e.g., Baltimore Harbor basin on the Patapsco River, Corsica River). Many waterfront homeowners are reporting greater abundance and density in local areas than in the last 20-30 years. Species and density shifts within existing beds may be producing greater coverage and increased diversity of native species. While the reports are encouraging, we will need to assess 2004 SAV acreages after the long-term Chesapeake Bay surveys have been completed later this year.

Macroalgae - Sometimes known as seaweed, these filamentous or leafy plants are a natural part of the Chesapeake Bay ecosystem. Like phytoplankton, macroalgae can bloom if conditions are right, potentially smothering bay grasses and contributing to low dissolved oxygen fish kills. Typically large blooms of macroalgae are not observed in Chesapeake Bay, except in small, localized patches.

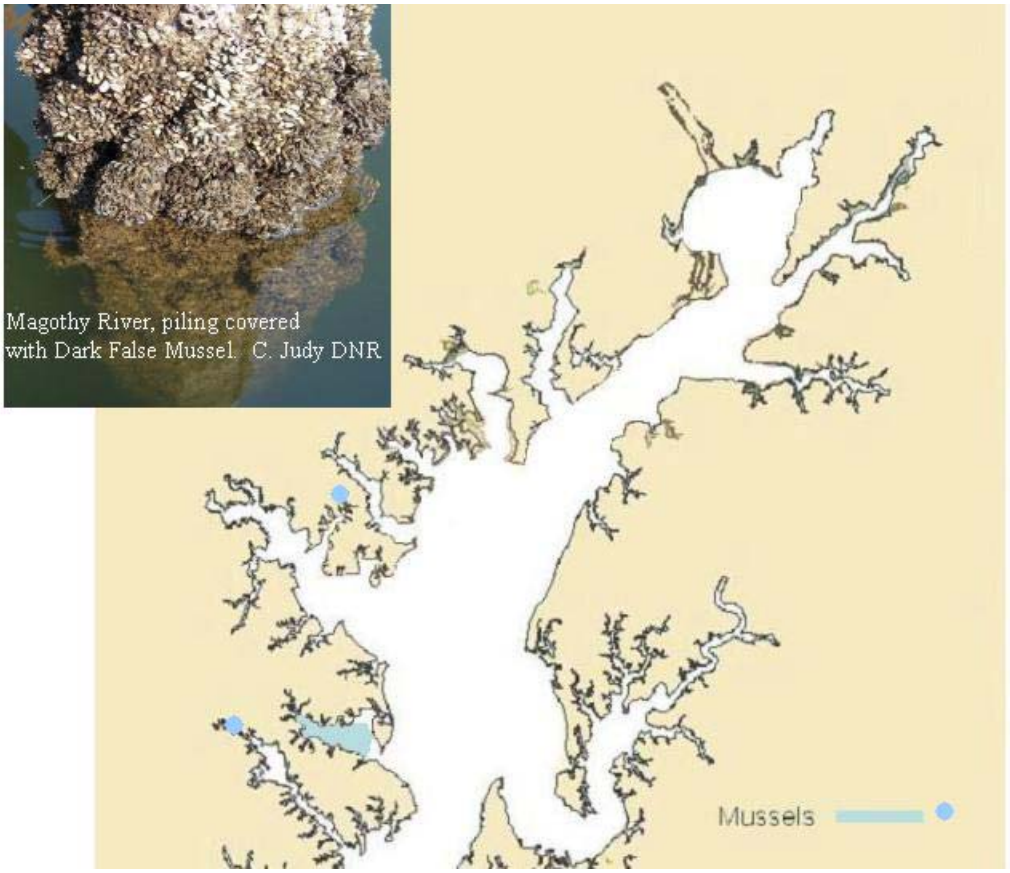
During May and June 2004, DNR received several citizen reports of macroalgae in tributaries near Baltimore. In July, watermen reported an extensive abundance of macroalgae throughout the upper Bay. In August, on the Susquehanna Flats, a 50 -100 acre bay grass bed was covered by a bloom of macroalgae. At its apparent peak in July, the macroalgae bloom is estimated to have covered over 20 miles of the upper Bay from the Susquehanna Flats down into the Pooles Island/Hart Miller Island area, the region most closely associated with clear waters in the upper Bay.

Macroalgae is covering crab pots and gill nets, limiting fishing ability with standard crab pot and net gear. The bloom has caused watermen to move farther south, impacted their fishing effort through fishing less equipment and having to retrieve their gear for cleaning in fewer days than anyone can remember. There is no indication that macroalgae has been as abundant in the recent past as what is being observed this year in the upper Bay.



Mussels – The Dark False Mussel (*Mytilopsis leucophaeta*) is one of several mussel species native to the Chesapeake Bay though not typically considered common or abundant. The mussel is small (typically less than one inch), attaches itself to rocks or other hard substrate, and prefers lower salinity waters. Like any filter feeder, mussels can act to improve water clarity by removing algae and sediment from the water, if the mussels are present in sufficient numbers.

During summer, 2004, greater than normal abundances of this mussel have been observed in the South River, Bear Creek (Patapsco River watershed) a localized area of the upper Severn River, and the Corsica River. The Magothy River, however, has been the primary area for a large population of the mussel extending from the headwater creeks to the mouth. Magothy River water clarity during May and July was at an all time record at DNR's long-term monitoring station on this river. A citizen report from Bear Creek on August 24 indicated the mussels are abundant and the water has been clear throughout the summer. Below average salinities in the second half of 2003 may have temporarily extended the range of good habitat for this species.



Why are we seeing these conditions?

Like any plants, bay grasses and macroalgae require sunlight to grow. Clear water, therefore, can promote the growth of these populations by increasing the amount of sunlight that reaches the bottom of the bay. Large beds of bay grasses and macroalgae, in turn, can help clear the water by trapping sediments

and consuming nutrients that may otherwise contribute to algal blooms. Similarly, mussels can help clear the water by filtering out sediments and phytoplankton. So the question is, which came first, the improved water clarity or the plants and mussels, and why?

One possible explanation is the following. We have been observing a slow but steady increase in Upper Bay bay grass populations over the past 10 – 12 years. This has probably been the result of gradually decreasing amounts suspended sediments in this portion of the Bay resulting from a wide variety of management actions. Then, during the Spring of 2004, Upper Bay water temperatures rose to 20 year highs due to the unusually hot weather we experienced in May. This warm water may have allowed bay grass populations to get an earlier than normal start on the season and grow to populations sizes that allowed the beds to not only survive, but to even maintain high water clarity when the rains came during the early summer. This clear water also allowed macroalgae populations to grow to levels not normally seen, in turn also helping to keep the water clear.

At the same time, the generally lower salinity on the Magothy and other rivers resulting from the high rainfall, allowed the dark false mussel populations to grow to unusually high levels. It is possible that the large amount of mussels on some of these rivers further helped to improve water clarity through their filtering of the water.

This is just one of several possible explanations for what we are observing this year in the Upper Chesapeake Bay. Maryland DNR is continuing to monitor the situation and to work with a wide variety of Bay researchers to better understand what we are observing.